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(71) Applicant  
Peter Lawrence  
P.O.Box 3, Western Road, Mitcham, Surrey, CR4 3ZD,  
United Kingdom

(72) Inventor  
Peter Lawrence

(74) Agent and/or Address for Service  
Laurence Shaw  
George House, George Road, Edgbaston, Birmingham,  
B15 1PG, United Kingdom

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A6H H2D4

(56) Documents cited  
GB 1377632 A GB 1176628 A US 4922050 A  
US 4534562 A US 3814438 A

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(54) Sorting cards

(57) Each card in a pack of playing cards is given a code and sorted by apparatus arranged to recognise the code of each individual card and to allocate the card to a predetermined hand for playing. The hands may be selected for playing duplicate bridge.

FIG. 2

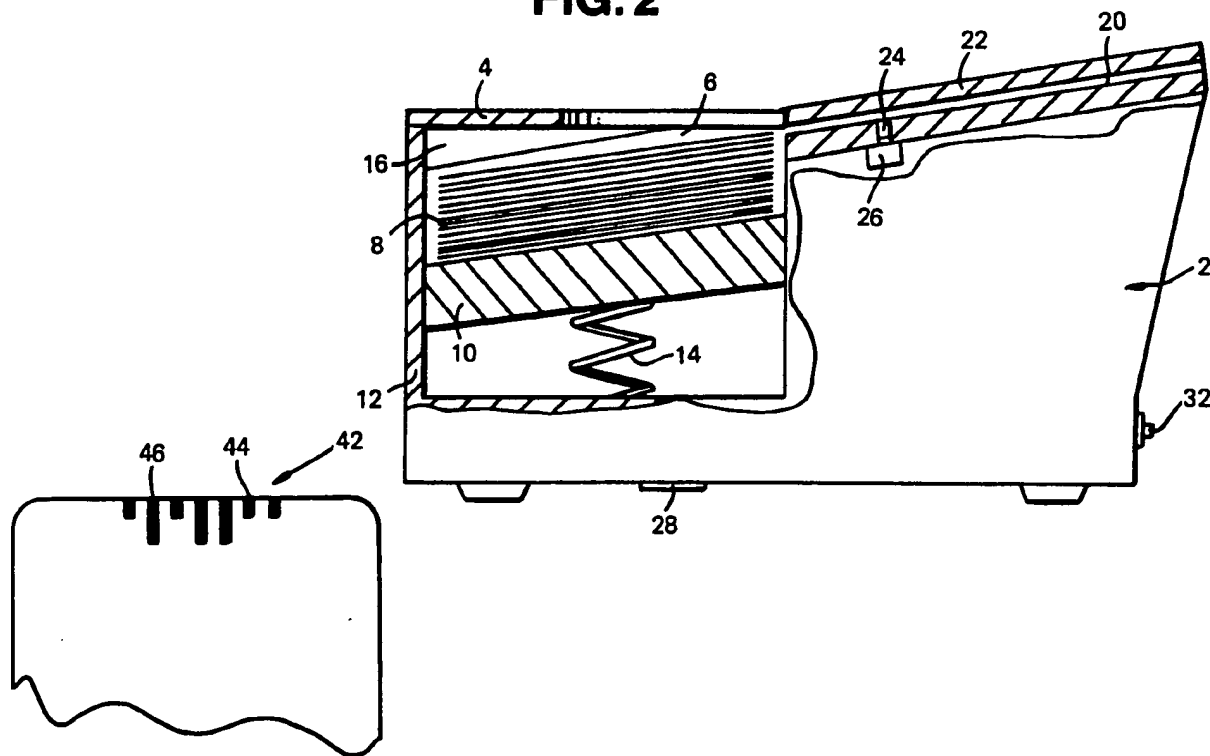
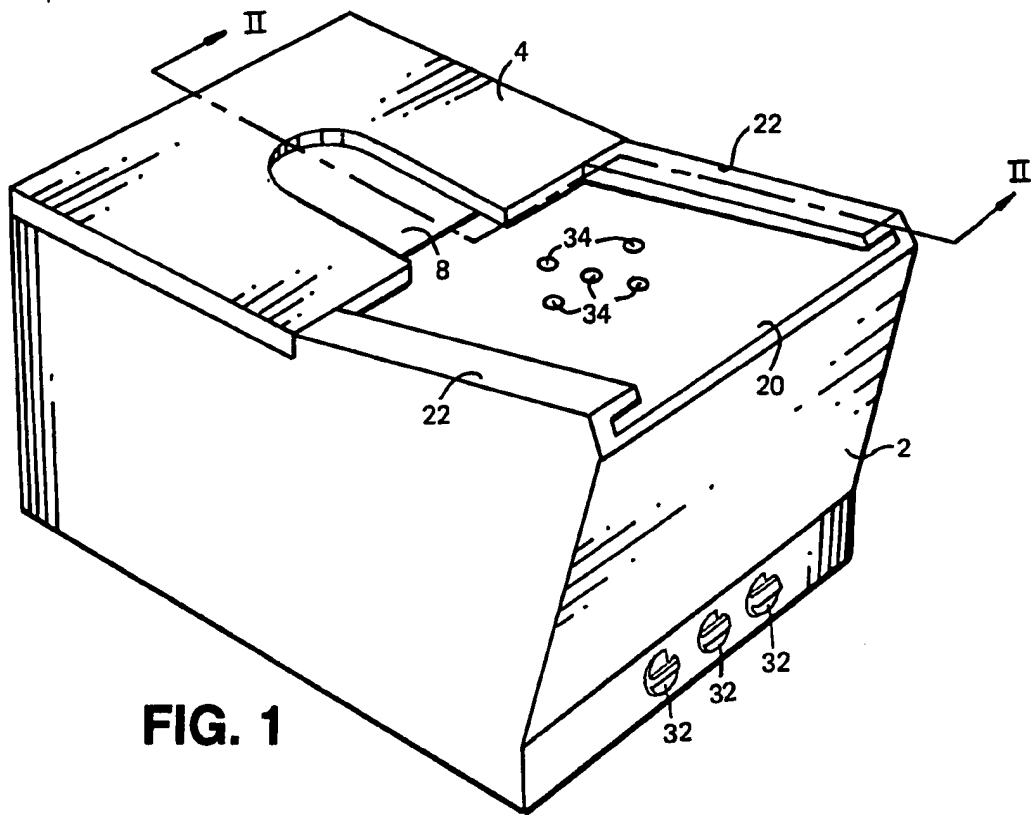


FIG. 4

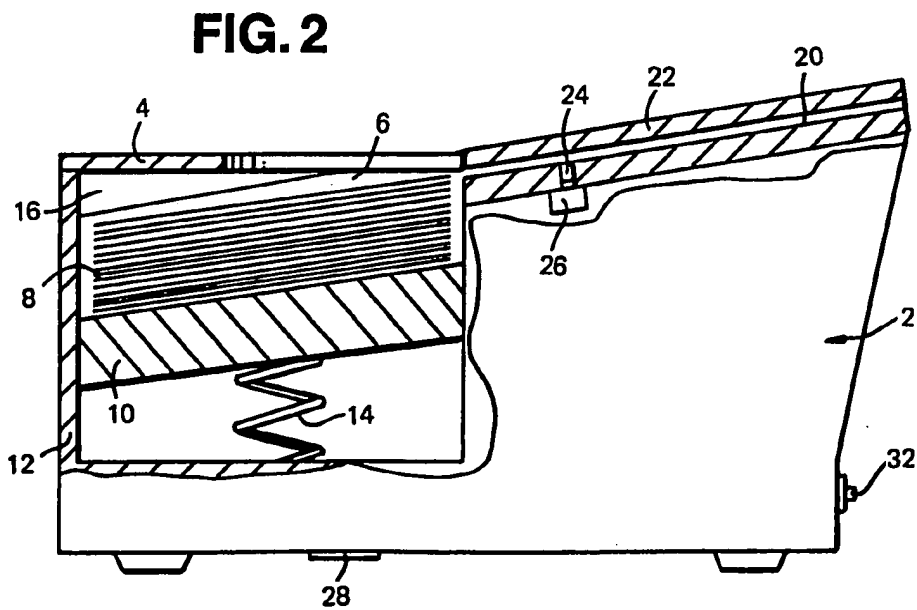
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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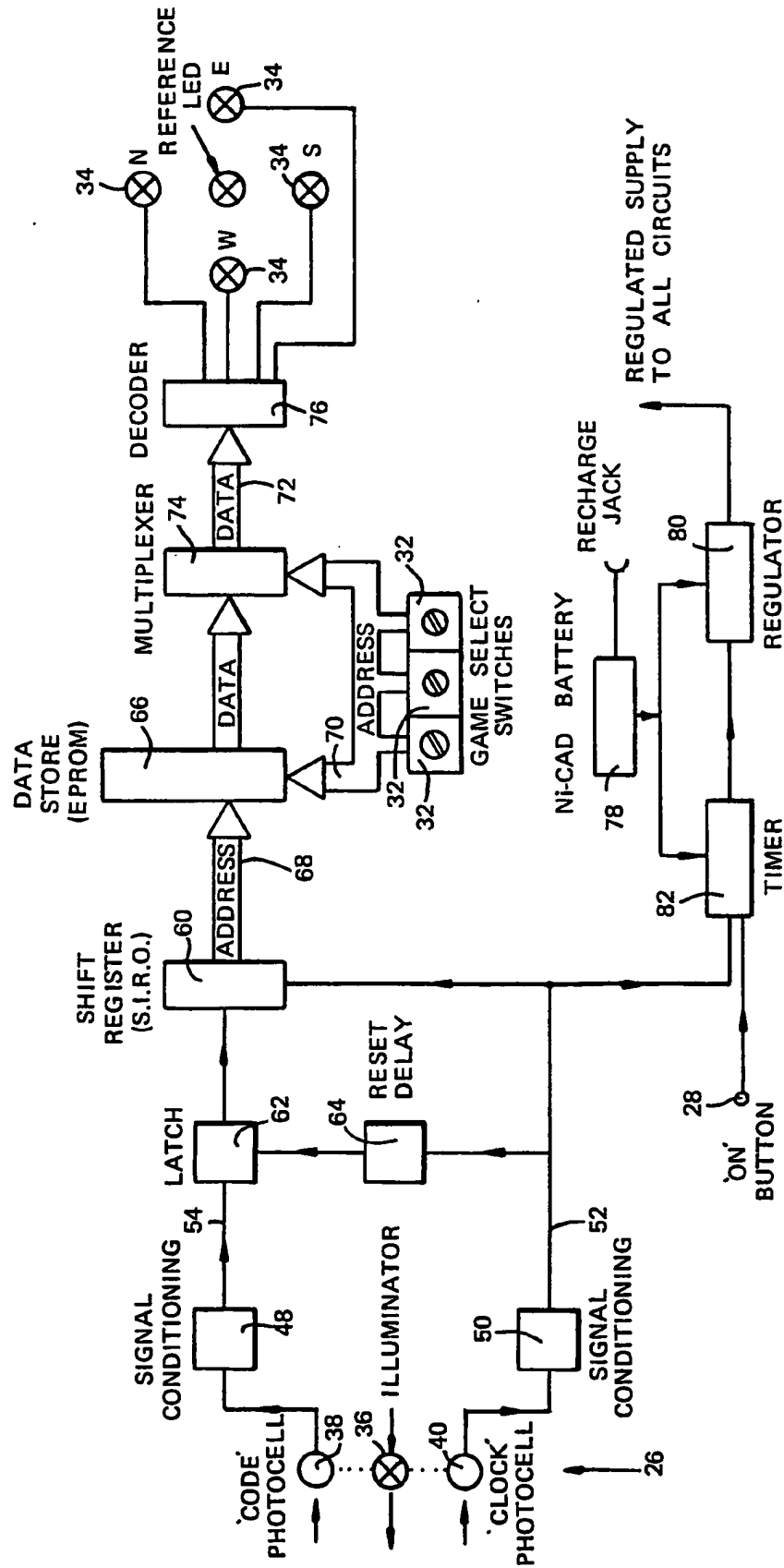
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**FIG. 1**

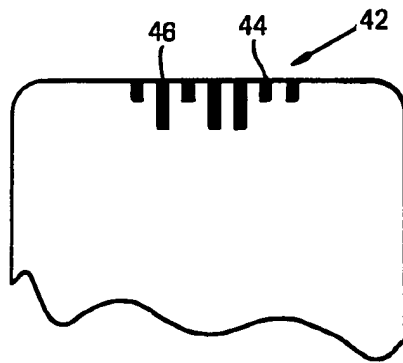


**FIG. 2**

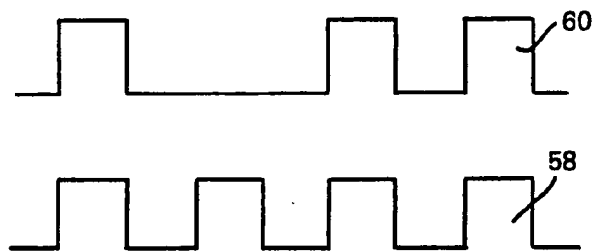


**FIG. 3**

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**FIG. 4**



**FIG. 5**

MEANS FOR SORTING PLAYING CARDS

This invention relates to means for sorting playing cards.

One of the blights of card games, eg bridge, is that on occasions long periods occur when uninteresting hands are dealt. The problem is particularly acute in teaching situations and/or, in the case of bridge, in a duplicate bridge competition.

Mechanical and electronic devices are known for storing predetermined interesting assortments, but if it is desired to use real cards to play, it is necessary for a non participant to sort the cards into the hands.

In accordance with one aspect of the invention, there is provided apparatus for sorting playing cards into predetermined hands, comprising: means for reading or detecting from a playing card, and recognising a code selected from a plurality of codes each identifying an individual card in a pack; means for selecting one of plurality of different deals; and means for indicating to which hand the card from which the data has been recognised belongs in the selected deal.

In practice, it is not possible to read the code by naked eyeball from the back of the cards which are presented to the apparatus one at a time. The apparatus indicates to which hand the card belongs and the card is dealt face down to that hand, instead of the normal sequence round the table. None of the players knows what the card is until it is picked up and its face can be viewed, however, and so a non participant is not necessary to sort the cards. In a duplicate bridge competition, it is possible for all players to play the same deal at the same time and/or to play every deal without the usual moving from table to table.

Preferably, the means for indicating includes storage means containing a plurality of records each relating to a respective assortment and including data as to which of a plurality of hands each playing card of a pack belongs, means for addressing the storage means with an address corresponding partly to the record relating to the selected deal and partly to the card from which the code was recognised; and output means responsive to the data retrieved from that address to indicate to which hand the card belongs.

The means for reading preferably comprises means for reading a mark code from the face of the playing card. In this case, the means for reading the mark code preferably includes an optical mark reader and a channel to guide the card past the reader.

The hand to which a card belongs may be indicated by illuminating one of a plurality of lamps, or LEDs or LED/LCD digital/analogue display.

The invention extends to the apparatus in combination with a pack of playing cards coded suitably to be read by the means for reading.

In accordance with another aspect of the invention, there is provided a pack of playing cards wherein each individual card includes a machine readable or detectable code which identifies that particular card but which may not be read by eyeball from the back of the card.

The code is a preferably a mark code on the face of the playing card.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of apparatus for sorting playing cards, in accordance with the invention;

Figure 2 is a side view, partly in section on arrows II-II, of the apparatus of Figure 1;

Figure 3 is a diagram of the electrical circuit of the apparatus of Figure 1;

Figure 4 is a view of one end of the face of a playing card showing the mark code thereon; and

Figure 5 is a timing diagram showing a clock pulse and a pulse coded signal in operation of the apparatus of Figure 1.

Referring to the drawings, the apparatus comprises a box generally indicated at 2. A removable cover 4 closes a compartment 6 containing the pack of cards 8 to be sorted. The compartment has a false bottom 10 which is inclined to the walls 12 of the compartment and which is urged upwardly by a pair of compression springs one of which is indicated at 14. Inside the lid are a pair of wedge shaped skids each having a low friction surface, one of which is indicated at 16. The pack of cards is thus compressed against the skids 16 at the top of the compartment.

The lid 4 has a slot 18 therein so that the top card of the pack 8 can be slid out from under the cover 4 across a surface 20 between two guides 22 which confine the card to an accurate track against the surface.



A slot 24 is formed in the surface 20 under one of the guides 22. Beneath the slot 24 an optical mark reader (OMR) 26 is mounted so as to read a mark code on the edge of a card as it is passed across the surface 20 between the guides 22.

In use, the apparatus is switched on by a switch 30, mounted underneath the box. A reference light emitting diode (LED) 30, visible through the surface 20, is illuminated to indicate that the apparatus is on. A deal is selected by three hexadecimal selector switches 32. Cards are then slid out of the compartment 6 across the surface 20 where the mark code is read by the OMR 26. Four hand-indicating LEDs 34 are arranged in a square about the reference LED 30 and one of these is illuminated to indicate to which hand the card which has been read should be dealt. In other arrangements, (not illustrated) the hand to which the card should be dealt may be indicated by an LED/LCD analogue and/or digital display.

Referring to Figure 3, the OMR comprises an illuminator 36 and two photocells 38 and 40. The illuminator 36 is directed through the slot 24 to illuminate the edge of the card shown in Figure 4 broadly. The edge of the face of the card is white superimposed with a black bar code 42 (see Figure 4). The face of the card is that on which its identity, e.g. suit and number or picture is marked for the players to recognise, i.e. its obverse. The back

or reverse of the card is usually marked with a pattern which is the same for every card in the pack, so that an individual card cannot be recognised by eyeball from the back. The mark code comprises black marks at spaced positions. The marks are of two kinds, short bars 44 which only affect the light reflected from the card to a clock photocell 40, and long bars 46 which affect the light reflected to both the clock photocell 40 and a code photocell 38. The outputs from the photocells 38 and 40 are conditioned by respective signal conditioning circuits 48 and 50 so that each mark produces one in a series of clock pulses 58 on line 52 and each longer mark also produces a code pulse 60 on line 54.

Each bit of the information contained in the mark code is represented by the presence or absence of a pulse 60 on line 54 coincident with a clock pulse on line 52. So as to accommodate skew between the signals on lines 52 and 54, each code bit is latched by a latch 62 on the transition in the code pulse corresponding to a white to black transition on the card. The transition of the clock pulse which corresponds to a black to white transition on the card, ie, at the trailing edge of the bar, clocks the code into a shift register 60. This trailing edge transition is delayed by a delay circuit 64, and the delayed transition resets the latch to receive the next bit of information in the pulse coded signal on line 54.

When the entire card has passed the OMR 26, the shift register contains a pattern of 0s and 1s corresponding to the mark code on the card. The code on each card in a pack is different so the pattern contained by the shift register identifies the particular card.

In order to provide interesting hands in a card game such as bridge, a data store in the form of an erasable programmable read only memory (EPROM) 66 is pre-programmed with a plurality of different records each specifying to which hand each card in a pack should be dealt.

In order that a plurality of different deals may be enjoyed, a plurality of records may be selected by manual input from the selector switches 32 on an address bus 70. Each record contains data identifying to which hand each card in the pack belongs. Part of the address to retrieve the stored data is formed by the parallel output of the shift register 56 on an address bus 68. Thus for each address selected by the switches 32 there is stored data representing to which hand each card, identified by the address on the bus 68, belongs.

The EPROM 66 is 8 bits wide. To store the information as to which of four hands a card belongs requires only two bits per card. Thus at each address in the EPROM 66 data for four different deals can be stored. To distinguish between the

records, two bits of the output of the EPROM 66 on a two bit data bus 72 are selected by a multiplexer 74 in accordance with two bits of the address on the bus 70.

The selected two bit output of the multiplexer 74 on the data bus 72 are input to a decoder 76 which provides four decoded outputs, one to each of the four hand-indicating LEDs 34, one of which will be illuminated to indicate to which hand the card should be dealt.

The apparatus is powered by a rechargeable Ni-CAD battery 34 via a regulator 80 controlled by a timer 82 so that the circuit switches off a predetermined time after the switch 28 is released, e.g. 25 secs. The timer 82 also receives a reset input from each clock pulse so that the apparatus would not normally switch off in a deal. It does not matter, however, if that should happen in the middle of a deal since the remaining cards would still be directed to the correct hands when the apparatus is switched back on.

Although the apparatus is illustrated with a hopper for the pack of cards a simpler version may be preferable with no hopper. In this case the cards are taken from the pack one at a time; passed across the apparatus to be read; and dealt to the hand indicated.

In other embodiments, the apparatus is designed to recognise

characters or designs on the card directly without the need for a mark code. Alternatively, each card has a magnetic stripe or other means by which the identity of the card is coded in a manner not recognisable by eyeball from the back of the card.

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CLAIMS

1. Apparatus for sorting playing cards into predetermined hands, comprising: means for reading or detecting from a playing card, and recognising a code selected from a plurality of codes each identifying an individual card in a pack; means for selecting one of plurality of different deals; and means for indicating to which hand the card from which the data has been recognised belongs in the selected deal.
2. Apparatus as claimed in claim 1, wherein the means for indicating includes storage means containing a plurality of records each relating to a respective deal and including data as to which of a plurality of hands each playing card of a pack belongs, means for addressing the storage means with an address corresponding partly to the record relating to the selected assortment and partly to the card from which the code was recognised to retrieve the data stored at that address; and output means responsive to the data retrieved from that address to indicate to which hand the card belongs.
3. Apparatus as claimed in claim 1 or claim 2, wherein the

means for reading comprises means for reading a mark code from the face of the playing card.

4. Apparatus as claimed in any claim 3, wherein the means for reading the mark code includes an optical mark reader and a channel to guide the card past the reader.
5. Apparatus as claimed in any preceding claim wherein the means for indicating includes four LEDs or lamps one for each of four hands, or an LED/LCD analogue and/or digital display.
6. Apparatus as claimed in any preceding claim in combination with a pack of playing cards coded suitably to be recognised by the means apparatus.
7. A pack of playing cards wherein each individual card includes a machine readable or detectable code which identifies that particular card but which may not be read by eye ball from the back of the card.
8. A pack of playing cards wherein the code is a mark code on the face of the playing card.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number 9102770.6

**Relevant Technical fields**

- (i) UK Cl (Edition K ) A6H (H2A2, H2D4)
- (ii) Int Cl (Edition 5 ) A63F 1/02, 1/06, 1/14, 1/18

**Search Examiner**

A T Blunt

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

13 March 1991

Documents considered relevant following a search in respect of claims

1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1377632 (FORSTER) - totality	1-3, 6-8
X	GB 1176628 (HALLOWELL IND) - totality	1-3, 6-8
X	US 4822050 (NORMAND) - totality	1-4, 6-8
X	US 4534562 (CUFF) - totality	1-8
X	US 3814436 (BOREN) - totality	1-3

SF2(p)





Category	Identity of document and relevant passages	Relevant to claim(s)

**Categories of documents**

X: Document indicating lack of novelty or of inventive step.

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E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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